heterophylly, promised enlightening information on the subject of the leaf-trace. Beyond an account of plants other than Proteaceæ which he had collected, Davie had not been able to complete the record of the results of his exploration. Alert in body and in mind, keen and undemonstrative in his work, thorough in everything, Davie gave promise of taking a prominent place amongst those upon whom rests the responsibility of scientific education and of extending the boundaries of science. Botany loses in him a talented and devoted adherent.

NOTES.

ON Friday, May 2, the Animal Anæsthetics Bill passed its second reading in the House of Commons. The object of this Bill is to insist on the use of anæsthetics in a large number of cutting operations on horses and dogs. The operations to which the Act should apply are specified in a schedule to the Act, in which a distinction is drawn between those which should be performed under general anæsthetics and those for which a local anæsthetic is required. It is worth noting that the Act does not apply to farm animals, on which operations for the improvement of their market value can continue to be performed without anæsthetics. Of the legislators who have been prominent in endeavouring to suppress experiments on animals performed with a view to prevention of human disease and suffering, we notice only the name of Sir J. G. Butcher as taking part in the discussion or supporting the Bill—another proof, if proof be needed, that the leading motive in these people is not kindness to animals or regard for their fellow-creatures, but opposition to the advance of science in general, and in our knowledge of the processes of life in particular.

IN the House of Commons on May 2 the Bill to control the importation of goods infected, or likely to be infected, with anthrax, and to provide for the disinfection of any such goods, was read a second time. Sir Hamar Greenwood, in moving the second reading, outlined the incidence of anthrax in this country and the findings of the Anthrax Committee. The Bill contains two principal provisions. It gives power by Order in Council to prohibit the importation of goods infected or likely to be infected, either absolutely or except at any specified ports, and it empowers the Secretary of State to provide and maintain the necessary works for the disinfection of goods. It is also likely that, under the auspices of the League of Nations, international action may be taken with a view to the control of anthrax.

IN the course of a discussion in the House of Commons on April 30 upon the subject of agricultural policy, the Parliamentary Secretary to the Board of Agriculture announced that the Government has decided to appoint a Royal Commission forthwith, and that all parties materially interested will be represented. He pointed out that a quick report is needed to enable the Government to frame a policy in the next few months. This may be obtained by an interim report on the more important branches of agriculture. It must be ascertained what guaranteed prices are necessary in order that, while good wages are paid, the industry is in a position to pay them. With such guarantees the farmer will have some idea of his economic position during the next few years which he has lacked during the past.

AEROPLANES waiting at St. John's, Newfoundland, for the Atlantic flight are still weather-bound, and, so far as can be judged from information issued as we are going to press both by the Meteorological Office and by the Air Minstry, there are storm areas in the Atlantic over a considerable portion of the route which would be followed in the flight. So far as possible choice should be made of a period at which the Atlantic high-pressure area is centred over the Azores, when for the route eastwards the winds would probably be westerly and generally of no great strength; the disturbances so commonly travelling eastwards would, under these conditions, be pushed to the northwards by the region of high barometer. However unsatisfactory it may be to get no wireless information from ships over the Atlantic, it seems much more unsatisfactory to contemplate starting without such information, since the chances of bad weather greatly preponderate. Settled weather on the western and eastern sides affords no idea as to the weather in mid-ocean. Under the auspices of the United States naval authorities, Curtiss seaplanes are now being entered for the Atlantic flight. It is intended to span the Atlantic by a succession of "hops." The start had been timed for the early part of this month, flying from Long Island to Halifax, thence to Trepassey, Newfoundland, and with fair conditions it was hoped to leave Trepassey for the Azores within ten days of the start from Long Island, and Lisbon was to be the next stop. A report in the *Times* of May 6 from New York says: "On the eve of their departure for Newfoundland two of the American trans-Atlantic seaplanes were seriously damaged by fire."

THE Army Medical Department announces the institution of two new appointments—a Director of Pathology and a Director of Hygiene. According to the *Times*, it is understood that Sir William Leishman is to be nominated to the former and Sir William Horrocks to the latter. The object of the scheme, which originates with the Director-General, Sir John Goodwin, is "to link up under a definitely planned organisation the activities of the different departments and individuals hitherto concerned with the various problems of preventive medicine, pathology, and tropical diseases bearing upon the health of the Army in peace and war." Advisory committees are to be set up in each directorate, consisting of the Director as chairman, a deputy director, and the following members:—*Hygiene:* The professor of hygiene at the R.A.M. College, a representative of the War Office and of the Directorate of Fortifications and Works, a sanitary engineer, a civil professor of hygiene or medical officer of health of a county or large city, a physiologist, and a representative of the Local Government Board. *Pathology:* The professors of pathology and of tropical medicine at the R.A.M. College, two civilian pathologists, a civilian professor or expert in tropical medicine, and a representative of the Medical Research Committee. The scheme is a thorough one, and should increase the efficiency of the Army Medical Department.

THE death of Dr. Edmund Weiss, director of the Vienna Observatory for thirty-two years, occurred so long ago as June 21, 1917, but was not announced to the Paris Academy of Sciences, of which he was a correspondant, until March 24 last. Dr. Weiss was born at Freiwaldau, in Austrian Silesia, on August 26, 1837, but some years of his early life were spent in England, for his father held an appointment as a physician in a health institution in this country. On the death of that relative Dr. Weiss returned to his native land, and, after a course of education at Troppau and the Vienna University, he was appointed assistant at the observatory in 1858, and on the death of Karl von Littrow in 1878 he succeeded to the directorship, which he held until 1910. In his early years as an observer Dr. Weiss took part in important geodetic work, and retained an active interest in that branch of science, being a prominent member of the International Geodetic Organisation. In 1872 he visited England and North America for the purpose of studying the methods of observatories and optical works, and thereby gained knowledge which was of great value to him; for though von Littrow had the satisfaction of seeing the building of the new Vienna Observatory at Währing begun as the result of his efforts, he did not live to see its completion, and the planning of the equipment was largely due to his successor. Dr. Weiss observed the transit of Venus of 1874 from Jassy, and took part in several eclipse expeditions. He made many contributions to the literature of astronomy through the usual channels on the subjects of comets, meteors, and orbits, besides others of a popular kind. Also he prepared a revised edition of Oeltzen's catalogue of Argelander's zones from 15° to 31° S. declination, published in 1890. Dr. Weiss was elected a fellow of the Vienna Academy in 1878, and an associate of the Royal Astronomical Society in 1883.

DR. PAUL CARUS, the distinguished editor of the *Monist* and the *Open Court,* died on February 11 at his home in La Salle, Illinois, at the age of sixty-seven. Dr. Carus was born and educated in Germany, his father being the Superintendent-General of the Prussian State Church. He studied first at Strasburg and afterwards at the Theological College of Tübingen, where he obtained his doctorate in philosophy in 1876. He went to Chicago in 1887 to become managing editor for the Open Court Publishing Co., an institution founded and richly endowed by his father-in-law, the late E. C. Hegeler. At the outbreak of the war Dr. Carus was notorious for his warm advocacy of the German view of the origin of the war. Yet he lived to rejoice in the defeat of Germany, the development of the conflict having served to enlighten him. His sons fought in the American Army against Germany. Dr. Carus's own writings show a wide and varied scholarship and range over many topics, taking the form sometimes of poetry, sometimes of philosophy. His chief interest was Oriental philosophy and religion, and he pursued it with the ardour of a propagandist. The Religion of Science Library which he founded has made available at a low price a number of religious and scientific books, and also many reprints of philosophical classics. Particularly to be noted are his English translations of Dedekind, Hilbert, Mach, and other distinguished mathematicians and physicists.

THE current number of the Kew Bulletin gives particulars of the career of M. H. Léveillé, who died on November 25 last in his fifty-sixth year. M. Léveillé was for a time professor of science at Pondicherry. He was the founder and permanent secretary of the Académie Internationale de Géographie Botanique, and edited for it *Le Monde des Plantes,* since renamed the *Bulletin de Géographie Botanique.* He was particularly interested in the flora of China, and published, among other works, a "Catalogue des Plantes du Yun-Nan." The same issue of the Bulletin also records the death of Mr. C. K. Bancroft, until recently Assistant Director and Government Botanist, British Guiana. Mr. Bancroft received his early scientific education at Harrison College, Barbados, and was the first to win a natural science scholarship in the West Indies, being awarded the Barbados scholarship in 1905. After graduating at Cambridge he devoted his attention to botany, especially mycology and plant pathology, and worked for a time at diseases of plants in the Jodrell Laboratory. In 1910 Mr. Bancroft was appointed Assistant Mycologist in the Federated Malay States, and three years later was made Assistant Director and Government Botanist, British Guiana, which position he occupied until breakdown in health brought about his resignation.

THE death of Sir Frank Crisp, Bart., on April 29, in his seventy-seventh year, removes from public life an eminent exponent of commercial law, and also a real force in scientific circles. Early in his career Sir Frank Crisp joined the Royal Microscopical Society, and in 1878 became one of its secretaries. He speedily improved the Journal of that body by enlisting the help of experts and publishing abstracts of biological articles, thus rendering a real service to science. He was unsparing of pains or purse, and when in 1889 he was compelled to end his secretarial labours he left the Journal established on a firm basis. Not less noteworthy was Sir Frank Crisp's influence on the conduct of the Linnean Society. From 1879 to the day of his death he served practically continuously on its council, and from 1881 to 1905, a period of twenty-four years, he was treasurer. His quick grasp of essentials, strong common sense, and generous disposition were of the greatest value during his long term of office, and his memory will be cherished as a large-hearted and clear-sighted adviser. His alpine garden at Henley is world-famous.

THE death, on April 30, of Dr. F. J. Smith, honorary consulting physician to the London Hospital, has removed from the medical profession in London one of its best-known and most popular members. Born at Castle Donington, Leicestershire, on August 17, 1857, Dr. Smith was educated at the University of Oxford, where he was a scholar of Balliol, at the London Hospital, and at the Universities of Leipzig and Halle. He was Radcliffe fellow during the years 1885–88. Dr. Smith's professional work lay particularly in the direction of pathology and of medical jurisprudence. In the former subject he paid special attention to diseases of the heart, while in the latter he attained a deservedly high reputation as the editor of the last three editions of Taylor's authoritative text-book. In 1904–6 he was president of the Hunterian Society, and was the orator of the society in 1900.

THE death is announced, at eighty-eight years of age, of Prof. E. Townsend, late professor of engineering and Registrar of University College, Galway.

THE Electrical Research Committee has appointed Mr. E. B. Wedmore as director of research.

NEXT Thursday, May 15, Prof. F. Keeble will deliver the first of a course of two lectures at the Royal Institution on intensive cultivation. The Friday evening discourse on May 16 will be delivered by Dr. S. F. Harmer on sub-Antarctic whales and whalings.

AT a recent meeting of the council of the Marine Biological Association of the United Kingdom it was announced that Dr. G. P. Bidder and Mr. E. T. Browne had each undertaken to contribute a sum of 500*l.* towards a fund for the extension of the laboratory at Plymouth. The new building will be commenced at once, and the scheme, when completed, will provide both a new and larger aquarium and special laboratories for physiological work.

THE British Scientific Research Association is about to appoint an assistant director of research at a salary of 1000*l.* per annum. The person appointed will be mainly responsible, under the director of research, for the researches arising out of the needs of the electrical scientific instrument, the X-ray, and the electro-medical instrument industries. Applications for the appointment, accompanied by not more than three testimonials or references, must reach the secretary of the association, 26 Russell Square, W.C.1, by, at latest, May 21.

AT the meeting of the Institution of Civil Engineers on April 29 H.M. the King of Italy and H.R.H. the Prince of Wales were elected as honorary members of the institution. It was announced that the council had made the following awards for papers read and discussed at the meetings during the session 1918–19:—A Telford gold medal to George Hughes (Horwich), a Telford gold medal and an Indian premium to R. B. Joyner (Bombay), a Watt gold medal to W. S. Abell (London), a George Stephenson gold medal to the Hon. R. C. Parsons (London), a Webb prize to F. E. Gobey (Horwich), Telford premiums to James Caldwell (London), H. B. Sayers (London), J. Reney Smith (Liverpool), and F. W. Scott (Benoni, Transvaal), and a Manby prize to E. L. Leeming (Manchester).

IN the March issue of *Man* Mr. A. C. Breton describes some Mexican small clay heads found in great numbers on the site of Teotihuacan. Almost every site in that region has its distinctive type of these little heads. Although much battered and archaic in style, they deserve reproduction for the treatment of the eyes, which consist of double hollows separated by a ridge, with no pretensions to represent the actual eye. Another figure in stone represents a frog, and is apparently a rain-charm, the frog being in Mexico and elsewhere intimately associated with the coming of the rain. In this example the frog is depicted with hands uplifted in a praying attitude, while the tongue hangs out as if with thirst. Mexicans say that the frogs pray for the rain, and in Yucatan the croaking of the large frog is a sure sign of rain within three days.

IN the *Rivista Italiana di Sociologia* (vol. xxi.) Prof. Giuffrida-Ruggeri attempts to analyse into its component elements the population of Abyssinia and the Italian colony of Eritrea. He claims that what he calls the "prehistoric stratifications" were composed of small negroes (pygmies), who came from the west and south, and the proto-Ethiopic people. To these were added the "historic stratifications," Semites from Arabia and the "deutero-Ethiopians" or Gallas, who entered the Abyssinian domain in the sixteenth century. Abyssinia may be regarded as an immense fortress or crucible in which these four racial ingredients were mixed. In conformity with the popular dogma of ethnology, Prof. Giuffrida-Ruggeri attempts to associate certain types of culture with the different *races*, ignoring the fact that in the course of the development of any invention it has always happened that the leaven of a new discovery is diffused abroad among the intelligent minorities of other peoples long before it has permeated the unintelligent lump of the bulk of the population in the home of its birth, so that by the time a practice or belief has been definitely shaped it is no longer the property of one "race," but of many peoples. Prof. Giuffrida-Ruggeri attributes the invention of agriculture, hut-construction, and the use of the bow to the primitive negro stratum; and to the proto-Ethiopians the practice of erecting dolmens and monoliths, and the worship of the sun and stars, of fire and water, of trees, serpents, birds, elephants, etc., as well as of the force of fertility. No adequate reasons are suggested for these daring speculations.

THE Journal of the American Museum of Natural History (part 1) contains a delightful article on the water-birds of Louisiana, illustrated by some very remarkable photographs. Thanks to very efficient measures of protection, the white egret, until lately the victim of the cruelty and greed of the plume-hunters, is now recovering its numbers, even though it had been reduced to the verge of extinction. The author, Mr. Alfred Bailey, is also able to report that the roseate spoonbill, similarly terribly reduced in numbers by the plume-hunters, is now in a fair way to recovery. Their guardian is an ex-plume-hunter! Finally, this number contains a series of "In Memoriam" articles on the late Col. Theodore Roosevelt, John Burroughs and Prof. H. F. Osborn being among the contributors.

THE report of the National Park Board, Tasmania, has just reached us. We gather from it that in 1917 some 27,000 acres were enclosed to form a reservation for the native fauna and flora of Tasmania. Though late in the day, this reservation, if it can be adequately protected against poachers—about which there seems to be some doubt—should perform a very real service to the State and the world at large from the point of view of the man of science. The larger lakes in this enclosure, we are told, have been "restocked with fish. The Fisheries Commission assisted by defraying half the cost of distributing 12,000 rainbow-trout fry." We trust that this experiment will not be at the expense of the native fish, which would defeat the avowed ends of the Board. The Government was asked for an annual grant of 500*l.* in order to develop the area. As a result 150*l.* was voted for the first year.

IN February last the New Zealand Institute, which consists of eight affiliated societies located in different centres of the Dominion, held a science congress at Christchurch under the presidency of Dr. L. Cockayne. The arrangements seem to have been modelled on the lines of the British Association, with public lectures, papers and discussions, excursions and a garden-party, the congress being opened by his Excellency the Governor-General. Apparently the New Zealand scientific workers no longer find the Australasian Association for the Advancement of Science adequate for their requirements, but we hope that the interchange of ideas and hospitality between the scientific workers in Australia and those in New Zealand will not suffer any diminution as a result of this interesting new departure.

THE study of cytology, and more especially of the mitotic phenomena that accompany the division of the nucleus, has made such rapid progress in recent years that the question of terminology has become a very troublesome one, and the student who is not a specialist in this department is apt to find some difficulty in following the voluminous literature of the subject. In a memoir on "The Somatic Mitosis of *Stegomyia fasciata*," published in the *Quarterly Journal of Microscopical Science* (vol. lxiii., part 3), Miss Lucy A. Carter, at the request of the editor, has given a glossary of the principal terms employed. Some of these terms are, no doubt, already sufficiently familiar to ordinary students, but the idea is one which should be welcomed by many. The derivation of "synizesis"—"syn," with; "hizo," place—is not very satisfactory, for the word clearly means "assembling together" or "placing together."

A SUB-COMMITTEE of the Food (War) Committee of the Royal Society has recently issued a report on the composition of potatoes grown in the United Kingdom. The report is based on the results of determinations of nitrogen and dry matter in 227 samples of ten varieties collected from sixty-five growers in eighteen English, seven Welsh, six Scottish, and twenty-three Irish counties. In addition to these, twenty "miscellaneous" samples were received and analysed. The report gives much valuable information as to the average composition of the potatoes grown in the United Kingdom, and discusses the variations in composition due to such causes as climate, soil, manuring, and size of tuber. The composition of different varieties and of different groups of varieties is also compared. Further work on many of these points is in progress. Perhaps the most important point raised by the issue of this report is the need for accurate information as to the composition of almost all home-grown foods. When the Royal Society Food (War) Committee was engaged in making its survey of the food supplies of the nation (Cd. 8421), one of the chief difficulties was the dearth of accurate systematic analyses of all kinds of home-grown foods, and the committee was forced to rely for the most part on American figures, which may not accurately express the composition of British-grown products. The report in question removes this difficulty for British-grown potatoes. It is to be hoped that reports on similar lines may follow dealing with other home-grown foods, but, unfortunately, work of this kind does not appear to be anybody's business. It is high time some organisation was set up to maintain on a permanent basis the survey of the food resources of the nation initiated by the Food (War) Committee of the Royal Society.

IN the March issue of *Terrestrial Magnetism and Atmospheric Electricity* Dr. L. A. Bauer and Messrs. H. W. Fisk and S. J. Mauchly complete their examination of the magnetic observations taken during the solar eclipse of June 8, 1918, and come to conclusions which may be summarised as follows:—Appreciable effects were observed during the eclipse at all stations within the zone of visibility, and warrant the statement that a solar eclipse causes a variation of the earth's magnetic field. The magnitude of the variation is from a tenth to a fifth of the solar diurnal variation of the element on a normal day. Its direction is, in general, opposite to that of the daylight portion of the solar diurnal change. The effects are seriously modified by the altitude of the observing station.

PARTICULARS of a large oil-fuel reservoir at Rosyth are given in the *Engineer* for April 4. The reservoir is in two sections, having a combined capacity of 60,000,000 gallons, and is constructed of concrete on a rock foundation. The retaining walls have an average height of 35 ft., and are reinforced with steel rods; each wall is in sections ranging from 54 ft. to 58 ft. in length, with expansion joints between. The concrete floor has a minimum thickness of 2 ft. 9 in., and the reservoir is covered with the roofing system known as the Belfast lattice-timber truss, with spans of 50 ft. Every precaution to secure oil-tightness was observed in the construction, with satisfactory results in the finished structure. The complete work occupies 11¼ acres, and the roof area is 7½ acres.

THE *Times* Engineering Supplement for April contains an article by Sir George Greenhill on geometrical and mechanical fit. The principles of geometrical fit were enunciated fifty years ago in the first edition of Thomson and Tait's "Natural Philosophy," but the message therein does not appear to have reached the mechanical engineer yet. The method of producing a geometrical rifle-rest described in Thomson and Tait appears to be too simple and subtle for the official mind to grasp, so the old-fashioned sealed pattern manifold point-rest is still at work, destitute of scientific theory, working against an excessive number of spring supports, and the rifle never returning exactly to the same position. It will be conceded by most people who have had business relations with instrument-makers that the principles of geometrical fits are still not generally understood. This is due, in part at any rate, to the conservative class of workmen employed. Sir George mentions the Cambridge Scientific Instrument Co. as using the geometrical fit principle, and might have added also the name of the firm of Barr and Stroud. There is no finer example of what can be done by geometrical appliances than the range-finder made by this firm.

AN illustrated account of a pulverised-fuel locomotive appears in the *Engineer* for April 25. The appliance has been invented by Mr. J. G. Robinson, chief mechanical engineer of the Great Central Railway, and, owing to the success already obtained, one of the large 2–8–0 engines is under construction with this apparatus. Up to the present the fuel employed consists of the settlings from the exhaust of the fans over the screening apparatus of the collieries, and has not received any treatment with the view of increasing its fineness, which is such that 80 per cent. will pass through a screen of 200 meshes per lineal inch; the ash content is about 10 per cent. Before being placed in the tender the fuel is dried by being stored for a few days over the flues of a battery of boilers. Considerable alterations have to be made in the internal arrangements of the fire-box in order to adapt it for burning pulverised fuel. The fuel is contained in a hopper in the tender, and fed to the furnace by conveyer screws driven by a small engine. On leaving the conveyers the fuel is met by a blast of air supplied by a fan driven by a de Laval steam turbine, and is led through pipes to the furnace. It would appear that this system of firing locomotives is at last attaining to a practical solution in this country as in America.

THE second report issued by the Conjoint Board of Scientific Societies states that the number of constituent societies is now fifty-four, and a list of these bodies, together with the names of their representative, is presented. A summary is given of the work of the various committees dealing respectively with (1) the Catalogue of Scientific Literature, (2) the application of science to agriculture, (3) national instruction in technical optics, (4) education, (5) the prevention of overlapping among scientific societies, (6) the metric system, (7) anthropological survey, (8) iron-ore, (9) water-power in the British Empire, (10) timber for aeroplane construction, (11) glue and other adhesives, (12) joint buildings for technical societies, (13) the foundation of a geophysical institute, (14) oxides and silicates, and (15) patent laws. The report issued by Committee No. 1 is at present confidential. No. 2 is considering the design, construction, and testing of electrical tractors and other agricultural machines. The committee dealing with education directs attention in a report on Civil Service examinations to the undesirable tendency to encourage mathematical studies to the detriment of other scientific subjects. In dealing with the scientific needs of the Civil Service the preponderance of appointments carrying literary rather than scientific qualifications demands attention, and as appointments are at present made largely by nominations, suitable men with scientific knowledge should be selected for appropriate administrative posts. The report issued on water-power in the British Empire has already been mentioned in these columns, and useful work has also been done in regard to the supply of timber for aeroplanes, glue, paper, etc. The foundation of a geophysical institute, which is to deal with geodesy, tidal phenomena, seismology, and allied matters, has been approved, and a small committee is now formulating a definite scheme.

WE notice the following among forthcoming books of science:—"Air Navigation Notes and Examples," Instructor-Capt. S. F. Card; "Tacheometer Tables," Prof. H. Louis and G. W. Caunt; "The Principles of Electrical Engineering and their Application," Prof. G. Kapp, vol. ii., Application (*Edward Arnold*); "The Pituitary," Blair Bell; "The Heart: Past and Present," Dr. E. Lea; "Injuries to the Head and Neck," Dr. H. Lawson Whale (*Baillière, Tindall, and Cox*); "The North Riding of Yorkshire," Capt. W. J. Weston; "Dumbartonshire," Dr. F. Mort, each in the Cambridge County Geographies Series (*Cambridge University Press*); "Economic Farm Buildings," E. P. Lawrence; "The Universal Wages Calculator," C. E. Lewton (*The Library Press, Ltd.*); "Kræpelin's Psychiatry," vol. iii., Dementia Præcox, translated by Dr. R. Mary Barclay, edited by Dr. G. M. Robertson; "A Handbook of Surgery (Civil)," C. R. Whittaker (*Edinburgh: E. and S. Livingstone*); "The Principles of Child Physiology, Pure and Applied," Dr. W. M. Feldman (*Longmans and Co.*).

OUR ASTRONOMICAL COLUMN.

DETERMINATION OF PROPER MOTIONS.—In Circular No. 43 of the Union Observatory, Johannesburg, Mr. Innes publishes the result of an examination with the blink microscope of pairs of plates of eighty astrographic fields lent to him for the purpose by the Astronomer Royal, the plates of each pair being separated by an interval of nearly twenty years. The fields cover the zone of the sky from declination 65° to 67° N. through the whole twenty-four hours of right ascension, and out of the whole number of stars examined, estimated at 20,000, Mr. Innes has found nearly four hundred which have a measurable P.M., the large majority of which were previously unknown. The largest motions are 290″, 179″, and 167″ centennial on a Great circle. There are five between 50″ and 100″, sixty-seven between 20″ and 50″, and more than 300 less than 20″ centennial. Two hundred and fifty of the stars are in the Bonn Durchmüsterung, and are, therefore, of all magnitudes down to 9·5 or 10 visual, whilst the remainder are of photographic magnitude 10 to 12, with a few fainter. It will be realised that the motion of a star thus determined is relative to the stars in a limited area surrounding it, and not to the heavens as a whole. The systematic character of the figures in the table gives assurance that Mr. Innes's work forms a useful contribution to stellar statistics.

THE BLINK MICROSCOPE.—The fundamental principle of this instrument is somewhat obscured by its name. Having two similar photographs of the same field of stars taken at some interval of years apart, the obvious method of determining motion would be to superpose these plates with identical images fitting one on the other so far as possible, and then to search for those images which do not fit. As actual superposition is difficult, or impossible, for practical reasons, a method only slightly less simple is to adjust the plates side by side and measure the distances between identical images with a measuring bar. This is the principle of more than one type of instrument now being used to determine proper motion. In the blink microscope the images of the same star on the two plates are seen alternately by rapidly closing and opening shutters. Hence the name. Two images which fit fall on the same spot of the retina, but those of a star which has motion do not, and give the sensation of a jump. The method of detection is therefore simple, but it is clear that the measurement must be made with discretion lest errors occur because of imperfect adjustment or lack of exact similarity of the plates.

CALCULATION OF OCCULTATIONS OF STARS BY THE MOON.—Mr. Arthur Snow publishes some tables for this purpose in *Popular Astronomy* for February, which should be of great use to those who do not live near one of the stations (Greenwich, Washington, etc.) for which special lists are available. He directs attention to the fact that the region of visibility of an occultation is a belt about half as wide as that for a total solar eclipse, crossing the parallels of latitude at a considerable angle, so that by no means all the places that lie between the published latitude limits enjoy a sight of the phenomenon. He gives full directions, which enable the limits of visibility to be laid down on a map.

X-RAYS AND BRITISH INDUSTRY.

THE war has furthered the progress and development of many industries, but probably no department of science has received greater impetus than that of radiology, using the word in the general sense which it ought usefully to convey, and not in that restricted sense which the medical world has attached to it. The science and art of X-rays have developed enormously during the war, and nothing but good can result from the fact that the general medical practitioner has had his eyes opened to the vista which the X-rays have revealed. He now realises, as never before, that radiology is a new instrument of attack for him—a veritable handmaiden, whether he be physician or surgeon. The new diploma of radiology which Cambridge and other universities are about to establish is tacit recognition of the importance of X-rays in a medical curriculum. We welcome the suggestion that a chair of radiology should be established at one of the universities in memory of the late Sir James Mackenzie Davidson.

But it is not our purpose at the moment to dwell on the medical aspect of the rays. We are more concerned with a development to which the Germans, Americans, and ourselves have given considerable attention during the past year or more. We refer to the examination of materials and built-up structures by X-rays—a subject to which a joint meeting of the Röntgen and Faraday Societies in the meeting-room of the Royal Society devoted its attention on April 29.

It is a very far cry from the days of Röntgen's famous discovery some twenty-two years ago to the present time. The technique has advanced amazingly, but it can scarcely be said that apparatus and equipment have made corresponding strides, although it is, of course, not denied that considerable progress has been made. We refer to this point later, but the question is tied up with the attention the subject has received at the hands of the physicist and electrical engineer.

The meeting to which we have referred served admirably to set out the development and present limitations of the industrial uses of X-rays, and those of our readers who are interested may be referred for details of the meeting to the journals of the two societies concerned.

The great advantage of radiography is, of course, the fact that we can spy out the interior of an opaque body without injuring it in any way. Chief among the materials which have been examined by the X-rays is steel, both carbon and alloy. Naturally, the question of blow-holes and flaws in castings and